Ozone Transport:
2001 Review

California Environmental Protection Agency

Air Resources Board

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State of California
California Environmental Protection Agency
Air Resources Board

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Staff Report

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Contents

Introduction

State law gives the California Air Resources Board (ARB) the responsibility to assess how the movement of air pollutants from one air basin to another (referred to as "transport") impacts ozone concentrations. The movement of air pollutants between areas can increase the ozone levels in downwind areas. Over the last decade, ARB has done a series of technical assessments of transport relationships between air basins in California.

The analyses done over the last decade have given us a good understanding of pollutant transport statewide – including the fundamental transport relationships between air basins. We have learned that urbanized areas largely cause their own air pollution and reducing local emissions needs to be the cornerstone of their clean air efforts.

We have also learned that under certain weather conditions, these urban areas can transport pollution to their downwind neighbors or receive pollution from their upwind neighbors. The assessments show that most urbanized areas contribute to air pollution in neighboring air basins under certain weather conditions. These same urbanized areas may be transport recipients at other times. In order to meet health-based air quality standards under all weather conditions, emission reductions are needed in both upwind and downwind areas. At the same time, emission reductions from upwind areas do provide benefits to the extent that transport occurs. These reductions are primarily a result of implementation of the "all feasible measures" requirement of the California Clean Air Act.

These benefits are taken into account as areas prepare the air quality plans required by the California Clean Air Act and Federal Clean Air Act. The next round of ozone plans will be developed in 2003 to meet the requirements of the California Clean Air Act. These plans will update our current control strategies for achieving the State ozone standard.

From a statewide perspective, areas downwind of the Los Angeles region (South Coast Air Basin) are the most severely impacted by ozone transport. The magnitude of pollution transport from the South Coast Air Basin sometimes overwhelms the impact of local emissions in downwind desert areas and San Diego.

In other parts of California, transport impacts are more variable – mostly ranging from inconsequential to significant depending upon the weather. However, overwhelming transport also occurs in the Mountain Counties Air Basin, North Coast Air Basin, Upper Sacramento Valley, and the North Central Coast Air Basin under some circumstances. This report summarizes the nature of ozone transport for each area.

While this report focuses on ozone, the transport of fine particles or particle-forming pollutants is also of concern. Many of the emissions that contribute to high levels of ozone also contribute to high levels of particles in the air. As we continue our efforts to understand and reduce particle pollution, we will apply what we have learned from our ozone transport assessments.

How the ARB Assesses Transport

The ARB staff assesses transport impacts by first identifying "transport couples" which consist of an upwind area and a corresponding downwind area. These areas are generally defined using air basin boundaries. California is divided by the ARB into 15 air basins (see Figure 1) consistent with State law. Areas with similar geographic and meteorological conditions are within the same air basin. Air basins are often separated by geographic boundaries like mountain ranges. Transport does occur, however, through mountain passes and over geographic boundaries at higher altitudes (referred to as "aloft" transport).

Some air basins consist of a single county district – such as the San Diego County Air Pollution Control District and Lake County Air Pollution Control District. Other air basins are multi-county air district – such as the San Francisco Bay Area Air Quality Management District and the San Joaquin Valley Air Quality Management District. And still other air basins span more than one air district. An air district is the local governing body responsible for controlling emissions from industrial pollution sources and adoption of local air quality plans and rules. Figure 2 shows a map of the local air pollution districts.

The Sacramento Valley Air Basin is further subdivided into two planning areas: the Broader Sacramento Area (where the population is most concentrated) and the Upper Sacramento Valley (more rural in nature).

This report includes a transport summary for each air basin or transport area. The summary describes the area, its air quality problems, and the nature of transport into and out of the region. In addition to identifying upwind and downwind relationships between air basins, the ARB assesses the degree of impact. State law directs the ARB to determine if the contribution of transported pollution is overwhelming, significant, inconsequential, or some combination.

These three labels are applied according to whether violations of the ozone standard are predominantly caused by transport, local emissions, or a mixture of both. A transport couple can have more than one label, meaning that the degree of impact varies from day to day depending on weather conditions. For instance, if a transport couple is characterized as both "shared" and "local", it means that on some days violations are caused by a mixture of transported and local emissions, while on other days they are caused primarily by local emissions.

The identification and characterization of transport couples is based on detailed analyses of one or more specific days when the State ozone standard was violated. The assessments are based on modeling and analyses of meteorological data, ozone monitoring data, and emissions data. Certain extreme ozone concentrations are excluded from the analyses if they are the result of rare circumstances beyond reasonable regulatory control.

Pollutant transport is a complex phenomenon. Sometimes transport is a straightforward matter of wind blowing from one area to another at ground level, carrying ozone with it, but usually it is not that simple. Transport is three-dimensional; it can take place at the surface, or high above the ground. Meteorologists use the terms "surface" and "aloft" to distinguish these two cases.

Often winds can blow in different directions at different heights above the ground. For example, the surface wind may be blowing down a valley while the winds overhead, above the surrounding hills, blow across the valley. To further complicate matters, winds can shift during the day, pushing a polluted air mass first one way, then another. To accurately determine the impacts of pollution transported from a source area upon ozone concentrations in a downwind area requires detailed scientific analyses and modeling studies.

Transport may have a significant impact on other pollutants such as fine particles. Although ozone and fine particles derive largely from similar pollution sources, ozone is primarily a summer problem while fine particles are usually more of a multi-seasonal problem. Since wind patterns are different from season to season, the transport relationships may be different for ozone and fine particles. Transport of fine particles and their precursors is a subject of ongoing research.

The relative impact of transport can change over time. Economic and population growth and the benefits of air quality programs can all act to increase or decrease one region's transport impact upon another. Furthermore, new monitoring, higher resolution data and improved air quality models can shed new light on transport impacts. The ARB will continue to assess transport impacts as new information becomes available.

How Responsibility for Reducing Pollution is Shared

Under the California Clean Air Act, when emissions from one region contribute to ozone violations in a downwind area, the upwind area shares responsibility for controlling those emission sources. The State and federal government also share in this responsibility for reducing emissions. The ARB's State Clean Air Plan targets statewide sources, such as fuels, consumer products, and motor vehicles. This plan provides emission reductions in all upwind and downwind areas. Federal measures are also necessary to address sources such as interstate trucks and federally preempted emissions sources. The ARB is now developing an updated 2001 Clean Air Plan.

The next round of ozone plans for most of the State will be developed in 2003 to meet the requirements of the California Clean Air Act. To support this significant effort, the ARB will be updating its prior planning guidance next year to reflect current circumstances and available technical data. A critical element of this guidance will define how transport should be considered in determining the appropriate mix of State,

upwind, and local control programs to attain in each region. We expect to use the same transport approach for future plans to meet the eight-hour ozone standard.

The clean air plans will reflect our best understanding of pollution transport to ensure all areas of the State reach attainment. The ARB will define the core State and federal measures that each region can rely on. All regions that continue to violate health-based standards (see Figure 3) will need to assess and reduce the local emissions contribution.

Rural areas that are dominated by an upwind area should ensure the local area has an effective program to address growth and prevent degradation of air quality. Upwind areas must address their share of responsibility for ozone levels in downwind areas; the ARB will work with the upwind and downwind areas to determine how to achieve any additional reductions needed for attainment in each region.

In the last several years, major field studies have been performed in Northern/Central and Southern California (see Figure 4). We will use the results from these field studies to develop regional modeling tools that reflect a more refined understanding of ozone formation and transport. These regional models, combined with our transport assessments, will be used in preparing upcoming clean air plans. The tools will be used to project the level of control needed to attain the standard and assess the benefits of existing and new control strategies.

Transport Impacts in the Future

As California's population continues to grow, traditionally rural areas are becoming more urbanized, and are generating more emissions. As this occurs, local emissions will become more significant in areas whose air quality has historically been dominated by transport from outside. Large urban areas are already required to implement stringent emission-reduction measures to improve their air quality. Newly emerging urban areas will need to take similar measures to maintain good air quality in the face of population and economic growth.

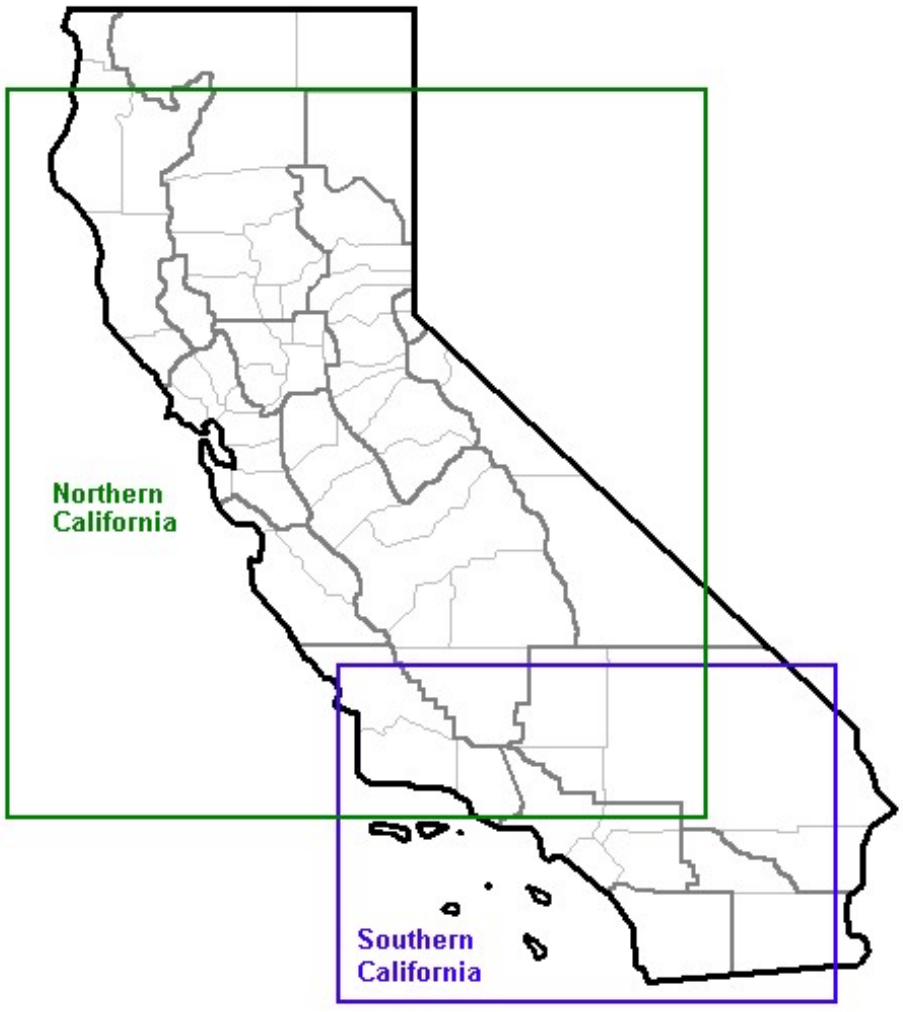
Figure 1. California Air Basins*

** The Broader Sacramento Planning Area and the Upper Sacramento Valley planning areas together make up the Sacramento Valley Air Basin. The Sacramento Valley Air Basin has been split into two planning areas.*

Figure 2. California Air Pollution Districts

Figure 3. State Ozone Standard Attainment Status

Figure 4. The Northern California and Southern California Modeling Domains

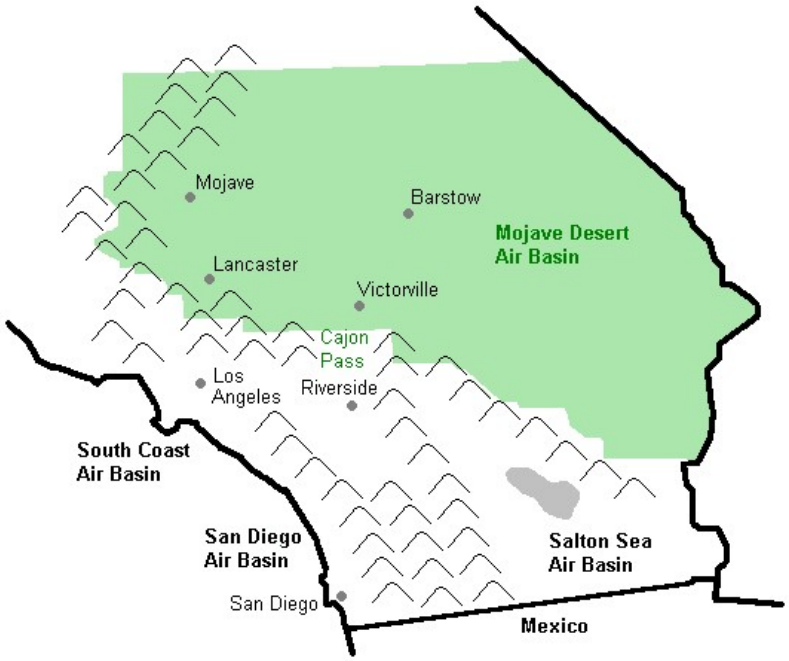


Regional Transport Summaries

The following sections summarize our knowledge of transport in the major regions of California. Not all regions have their own sections: the North Coast and Great Basin Valleys are discussed briefly in the sections on the San Francisco Bay Area and the San Joaquin Valley, respectively. Northeast Plateau (Lassen, Modoc, and Siskiyou counties), Lake County, and the Lake Tahoe Air Basin attain the State ozone standard, and are therefore not included in the discussion.

For each region, we describe the area and its current air quality status, and characterize its transport relationships with other areas. We also include a table of some important statistics compared to statewide totals, and tables summarizing its transport relationships.

Mojave Desert Air Basin



The Mojave Desert Air Basin violates both State and federal ozone standards. Continued reductions in air pollutant emissions are needed in order to meet the 2007 deadline for attainment of the federal one-hour standard, and make progress towards the State standard. The air basin is impacted by emissions from the San Joaquin Valley and the South Coast, although local emissions also contribute to poor air quality. The air basin's population is substantial and growing. As air quality continues to improve in the South Coast, local emissions from the Mojave Desert Air Basin will become a more significant factor in its air quality.

Area Description

The Mojave Desert Air Basin covers a large part of the California's high desert. It includes the eastern half of Kern County, the northern part of Los Angeles County, most of San Bernardino County except for the southwest corner, and the eastern edge of Riverside County. It is separated from the South Coast Air Basin, to its south, by the San Gabriel and San Bernardino Mountains. It is separated from the San Joaquin Valley, to the northwest, by the Tehachapi Mountains and the south end of the Sierra Nevada. The Antelope Valley APCD, the Kern County APCD, and the Mojave Desert AQMD manage distinct portions of the air basin.

Although the eastern part of the basin is sparsely populated, the area just north of the San Gabriel and San Bernardino Mountains supports a large population. The Lancaster-Palmdale area has a population of over 250,000, while the Victorville-Hesperia-Apple Valley area has over 180,000. Apart from these urban areas the largest

is Barstow with approximately 23,000. Military bases, highways and railroad facilities, cement manufacturing and mineral processing contribute to the region's ozone precursor emissions.

Transport Characterization

The portion of the Mojave Desert immediately to the north of the San Gabriel and San Bernardino Mountains is heavily impacted by transport from the South Coast. Air monitoring stations at Hesperia and Phelan show the impact of surface transport through the Cajon Pass.

In addition, transport aloft carries pollutants over the mountains to impact a broad area including Twentynine Palms and Lancaster-Palmdale. Despite the importance of transport from the South Coast, previous analyses have demonstrated that local emissions play a significant role in causing ozone violations in this area.

The air basin receives pollutants from the San Joaquin Valley as well. The area immediately downwind of Tehachapi Pass receives pollutants from the southern San Joaquin Valley. Violations in the town of Mojave in the eastern portion of Kern County are attributed entirely to this transport. The influence of pollutants from the San Joaquin Valley extends as far as Lancaster.

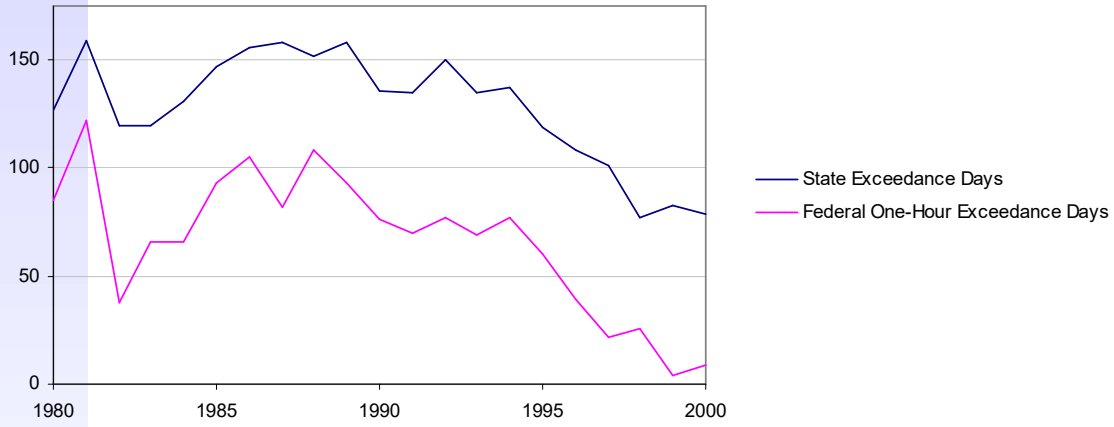
Mojave Desert Air Basin Facts

		Percent of State total
Estimated 2000 Population	860,000	2%
Vehicle Miles Traveled	26 million miles/day	3%
Est. 2000 NOx Emissions	220 tons/day	6%
Est. 2000 ROG Emissions	84 tons/day	3%

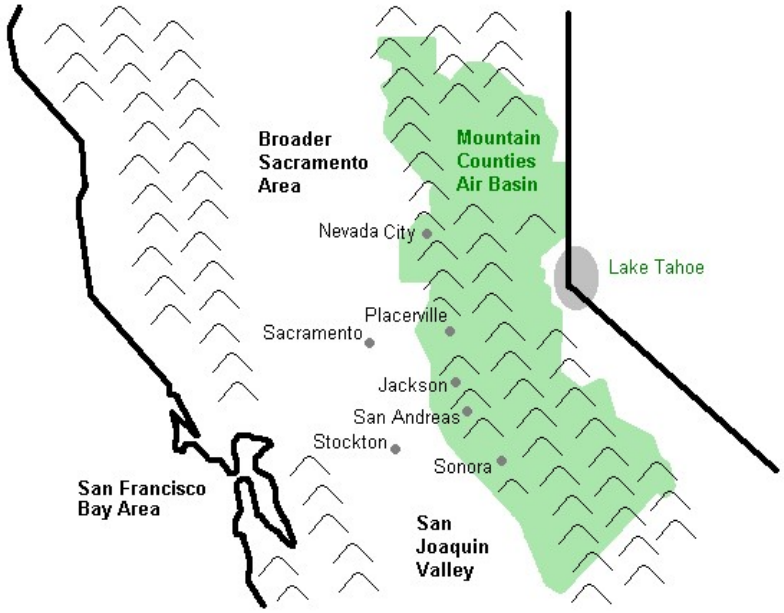
Other areas' impact on the Mojave Desert Air Basin

Area	*Day Specific Findings*
San Joaquin Valley	Overwhelming
South Coast	Overwhelming Significant

Mojave Desert Air Basin
Ozone Exceedance Trends



Mountain Counties Air Basin



The Mountain Counties Air Basin violates the State ozone standard due to transport from the Sacramento Valley, the San Joaquin Valley and the San Francisco Bay Area. The region attains the federal one-hour standard, except for the western portions of El Dorado and Placer counties which are part of the Sacramento federal nonattainment area. Because the region's ozone violations are the result of transport, the Mountain Counties' air quality planning process was not triggered by the California Clean Air Act. Instead the region is relying principally on emission reductions from the upwind areas. However, in the future, local pollution emissions are expected to contribute to ozone concentrations as the population continues to grow.

Area Description

The Mountain Counties Air Basin covers the central and northern parts of the Sierra Nevada, from Plumas County in the north to Mariposa County in the south. The basin comprises all or portions of seven air quality control districts: the Northern Sierra AQMD, and the Placer, El Dorado, Amador, Calaveras, Tuolumne and Mariposa County APCDs. The air basin is thinly populated, its communities separated from one another by the basin's complex terrain.

Logging and mining, historically the economic basis of Sierra Nevada communities, have given way to tourism and recreational activities in recent years. A substantial number of people living in the air basin commute to jobs in the Central Valley. The largest source of pollutant emissions is motor vehicles. Vehicles travelling on

transportation corridors such as Highway 50 and Interstate 80 account for a significant portion of motor vehicle emissions.

Transport Characterization

Topographically, the basin consists largely of a succession of east-west canyons and intervening ridges. The elevation ranges from several hundred feet in the foothills near the Central Valley, to over 10,000 feet at the crest of the Sierra. Surface winds are generally restricted to flowing in an east-west direction, uphill during the day and downhill at night. Pollutant transport is predominantly from the Central Valley up the canyons during the day, then back down at night.

Because much more pollution is emitted in the large urban areas of the Central Valley and San Francisco Bay Area than in the sparsely populated Sierra Nevada, pollutants transported from those urban areas have a dominant effect on ozone concentrations in the Mountain Counties. All State ozone violations have been attributed to transport from the Broader Sacramento Area, the San Joaquin Valley and/or the San Francisco Bay Area.

The Mountain Counties Air Basin regularly experiences violations of the State ozone standard. The northern and central parts of the region (Grass Valley, Placerville, Jackson, and San Andreas) can receive pollutants from the Broader Sacramento Area, the Bay Area, or the San Joaquin Valley, or a combination of areas depending on the weather. For the southern part of the region (Sonora and Yosemite National Park), the primary source of pollutants is the San Joaquin Valley. On other days, the San Joaquin Valley and the San Francisco Bay Area contribute to the violations.

Today, ozone violations in the Mountain Counties Air Basin are caused entirely by emissions from the San Joaquin Valley, the San Francisco Bay Area and the Broader Sacramento Area. However, in the future, local pollutant emissions may contribute to ozone concentrations in the Mountain Counties Air Basin as the population continues to grow. Moreover, the region has a close economic relationship with the Central Valley and San Francisco Bay Area. People from the region commute to work in the cities, and people from the cities travel to and from the mountains for recreational activities.

This transportation activity contributes to ozone problems both in the Mountain Counties and in the more heavily populated areas. The region can contribute to needed reductions in pollutant levels and offset the impacts of growth by implementing all cost-effective and technologically feasible measures.

(the facts and data shown on the following page exclude the portions of El Dorado and Placer Counties that lie within the Broader Sacramento Area)

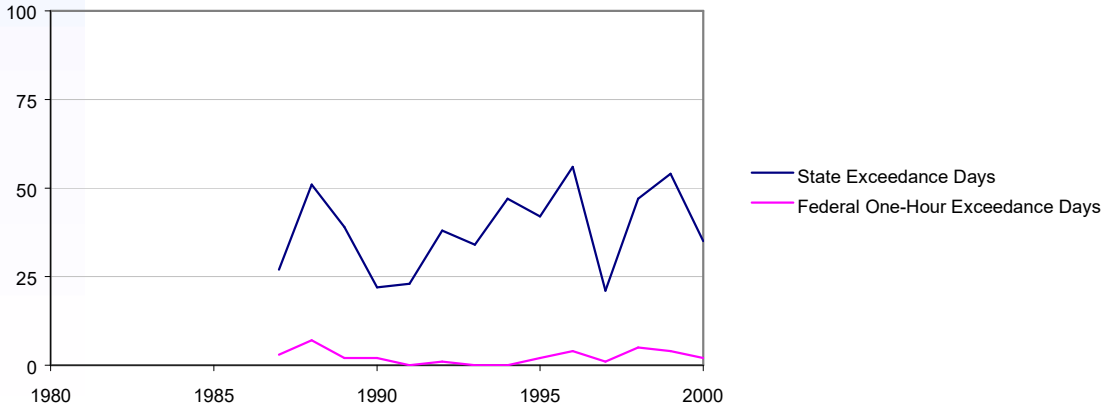
Mountain Counties Air Basin Facts

		Percent of State total
Estimated 2000 Population	353,000	1%
Vehicle Miles Traveled	10.6 million miles/day	2%
Est. 2000 NOx Emissions	54 tons/day	2%
Est. 2000 ROG Emissions	96 tons/day	3%

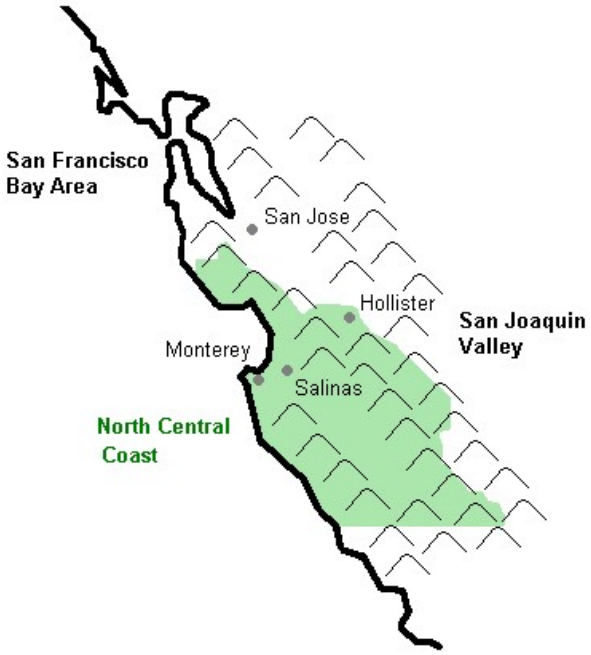
Other areas' impact on the Mountain Counties Air Basin

Area	***Day Specific Findings***
Broader Sacramento Area	Overwhelming
San Joaquin Valley	Overwhelming
San Francisco Bay Area	Significant

Mountain Counties Air Basin
Ozone Exceedance Trends



North Central Coast Air Basin



The North Central Coast Air Basin continues to violate the State ozone standard at a few locations. The region now attains the federal one-hour standard. Although most exceedances are caused by transport, the area's growing population could begin to cause local exceedances unless there are continued local efforts to reduce emissions from local sources. While improved air quality in the North Central Coast area relies on emission reductions in upwind areas, local measures are needed to help offset the emissions from growth and to assure attainment and maintenance of all health-based standards.

Area Description

The North Central Coast Air Basin consists of Santa Cruz, San Benito and Monterey Counties, and is synonymous with the Monterey Bay Unified Air Quality Management District. The largest population centers are Santa Cruz, Salinas, and Monterey and its surrounding communities. The estimated 2000 population of the region is roughly 700,000.

The largest urban area in the air basin is Salinas, with a population of 130,000, followed by the Monterey area, with a population of roughly 100,000. The region has significant sources of ozone precursors in the form of a large cement plant at Davenport, the Moss Landing power plant, agricultural activities, and Highway 101.

While emissions from urban areas in the region contribute to ozone violations in Hollister, its air quality is dominated by pollutants transported from the San Francisco

Bay Area. The air basin adjoins the San Francisco Bay Area to the north but is physically separated by the Santa Cruz Mountains and the coast ranges. However, the valley of the San Benito River, where Hollister is situated, forms a southern extension of the Santa Clara Valley. The region is also adjacent to the San Joaquin Valley Air Basin, separated by the Diablo Range with gaps such as the Pacheco Pass.

Transport Characterization

The North Central Coast Air Basin enjoys relatively clean air, experiencing only several exceedances of the State ozone standard per year. All of these exceedances have a transport contribution. The amount of transport can vary from significant to overwhelming and the source of the emissions can vary depending on the day.

The region can receive surface transport from the Bay Area which impacts Hollister and Scotts Valley. Violations at Scotts Valley, on the Highway 17 corridor in the mountains north of Santa Cruz, are mainly due to surface transport from the San Jose area, while transport aloft from the Bay Area can impact Pinnacles National Monument in the mountains south of Hollister. Transport aloft from the northern San Joaquin Valley mixed with pollutants from the Bay Area infrequently impacts Hollister's air quality as well.

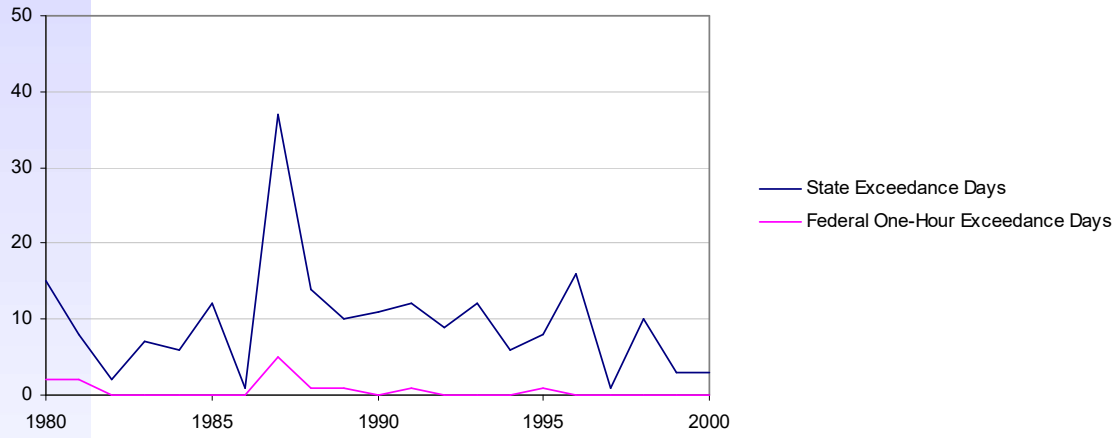
North Central Coast Air Basin Facts

		Percent of State total
Estimated 2000 Population	714,000	2%
Vehicle Miles Traveled	16.6 million miles/day	2%
Est. 2000 NOx Emissions	78 tons/day	2%
Est. 2000 ROG Emissions	79 tons/day	2%

Other areas' impact on the North Central Coast Air Basin

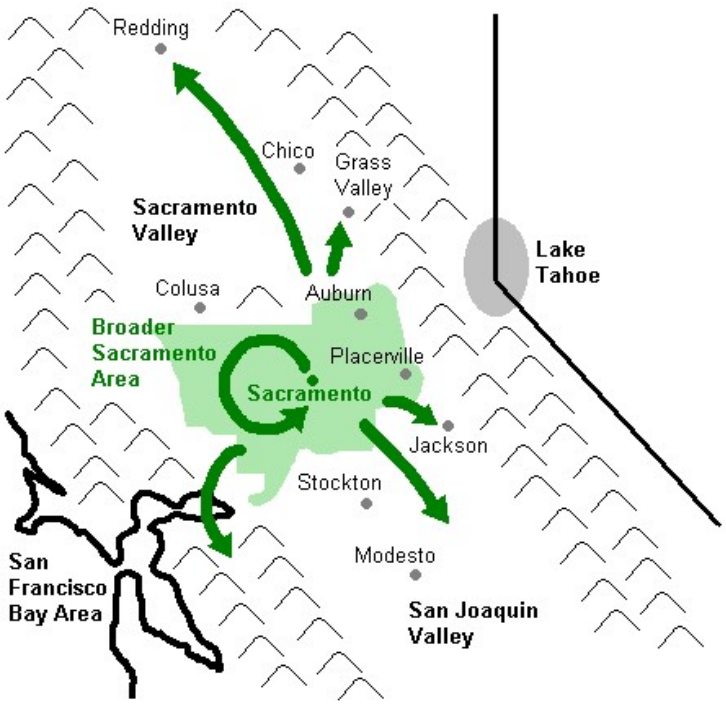
Area	*Day Specific Findings*
San Joaquin Valley	Significant
San Francisco Bay Area	Overwhelming Significant

North Central Coast Air Basin
Ozone Exceedance Trends



Sacramento Valley Air Basin:

Broader Sacramento Area



The Broader Sacramento Area continues to violate the State and federal air quality standards for ozone. Although the air quality in the area is impacted to some degree by transport, the emissions from within the region are responsible for some of the region's smoggiest days. Continued reductions of pollutant emissions are needed in order to meet the 2005 deadline for attainment of the federal one-hour ozone standard and make progress towards attaining the State standard.

Area Description

The Broader Sacramento Area encompasses the city of Sacramento and surrounding areas. It includes all of Sacramento and Yolo Counties, the southern part of Sutter County, the western portion of Placer and El Dorado counties, and the eastern part of Solano County. Distinct portions of the BSA are administered by the Sacramento Metropolitan AQMD, the Yolo-Solano AQMD, the Feather River AQMD, and the Placer and El Dorado County APCDs. The cities of Davis, Vacaville, Woodland, Rocklin, Auburn, and Placerville, among others, all lie within this region.

Geographically, the Broader Sacramento Area occupies the southern part of the Sacramento Valley. East-west, it extends from the foothills of the Coastal Range to the foothills of the Sierra Nevada. These mountain ranges form natural barriers to air movement. North-south, the area extends from the southern part of Sutter and Placer Counties to the Sacramento River delta. There are no significant barriers to north-south air movement in the Sacramento-San Joaquin Valley. The Sutter Buttes, to the north, are not wide or high enough to present a major obstacle to airflow into the northern Sacramento Valley.

Motor vehicles are by far the largest source of ozone precursor emissions in the area. Between 1980 and 2000, the number of vehicle miles traveled doubled. However, the increase in vehicle usage was offset by increasingly stringent motor vehicle emission controls and cleaner burning gasoline. The peak ozone concentration and number of violation days in the area have decreased slightly during the last decade, but progress has been slower than in some other parts of the State such as the South Coast.

Transport Characterization

On most summer days, the so-called "delta breeze" blows from the Carquinez Strait northeast towards Sacramento. Reaching Sacramento, the delta breeze turns northward and continues into the northern Sacramento Valley and the foothills of the northern Sierra Nevada. Transport from the Broader Sacramento Area into the Upper Sacramento Valley has been documented repeatedly over the last two decades. Although not documented, it is possible under the right conditions that Bay Area emissions could also be carried to the Northern Sacramento Valley and to the foothills of the northern Sierra Nevada.

Transport from the Broader Sacramento Area dominates the air quality in the Upper Sacramento Valley, as far north as Butte and Tehama County. However, violations in Shasta County, at the northern end of the Sacramento Valley, are occasionally entirely due to local emissions, sometimes entirely due to transport, and sometimes a mixture of both.

Another characteristic wind pattern of the southern Sacramento Valley is a counterclockwise circular eddy which carries pollutants from Sacramento to the northwest, then south to Woodland and Davis, then eastward, back to Sacramento. This circulation carries ozone and precursors from Sacramento to Colusa and Arbuckle in the Upper Sacramento Valley.

On some summer days, winds sweep down the Sacramento Valley from the north. This wind carries pollutants into the northern San Joaquin Valley, where they impact communities such as Stockton, Turlock and Modesto. Because it is located downwind of both the Broader Sacramento Area and the San Francisco Bay Area, the northern San Joaquin Valley is subject to a complex mixture of influences.

Infrequently, a north wind blowing through the Broader Sacramento Area can turn westward and carry pollutants to the eastern part of the San Francisco Bay Area. Under such conditions, violations at Fairfield and Pittsburg can be significantly impacted by pollutants transported from the Broader Sacramento Area. This influence is confined to the Sacramento-San Joaquin River delta. Violations at Livermore, Fremont, Hayward and San Jose on the same days are not affected by transport from the Broader Sacramento Area.

On days when the north wind carries pollutants from the Broader Sacramento Area into the northern San Joaquin Valley, afternoon breezes from the west may then push polluted air from the valley into the Sierra Nevada foothills. Under these conditions foothill communities such as San Andreas, in Calaveras County, and Jackson, in Amador County, can be impacted by Broader Sacramento Area emissions. On such days, the transport contribution can be shared between the BSA, the northern San Joaquin Valley and the San Francisco Bay Area.

In the northern Sierra Nevada foothills, Grass Valley, in Nevada County, and Colfax, in Placer County, have violated the State ozone standard almost every summer for the last decade. These violations are considered to be entirely due to transport from the Broader Sacramento Area.

Air quality in the Broader Sacramento Area is impacted to some degree by transport from the San Francisco Bay Area and, infrequently, from the San Joaquin Valley. On some days when the State standard is violated, the Sacramento area is impacted by transport of pollutants from the Bay Area. This occurs when there is a slight to moderate delta breeze in the morning which can carry commute hour emissions into the Sacramento area to mix with local emissions and react with the summer sun to produce ozone. This meteorological scenario typically leads to peak daily ozone concentrations above the State ozone standard of 0.09 but below the federal one-hour standard of 0.12 ppm.

However, on very hot summer days when the temperature in Sacramento climbs into the high 90's and above, stagnant wind conditions allow a buildup of local emissions, and the ozone concentration can violate the both the State and federal standards. Only when a strong evening delta breeze disperses these accumulated pollutants does the ozone concentration decrease. However, this evening delta breeze could also carry pollutants into the Sacramento area and then potentially contribute to ozone formation the following day.

Broader Sacramento Area Facts

		Percent of State total
Estimated 2000 Population	1.8 million	5%
Vehicle Miles Traveled	45 million miles/day	6%
Est. 2000 NOx Emissions	184 tons/day	6%
Est. 2000 ROG Emissions	185 tons/day	5%

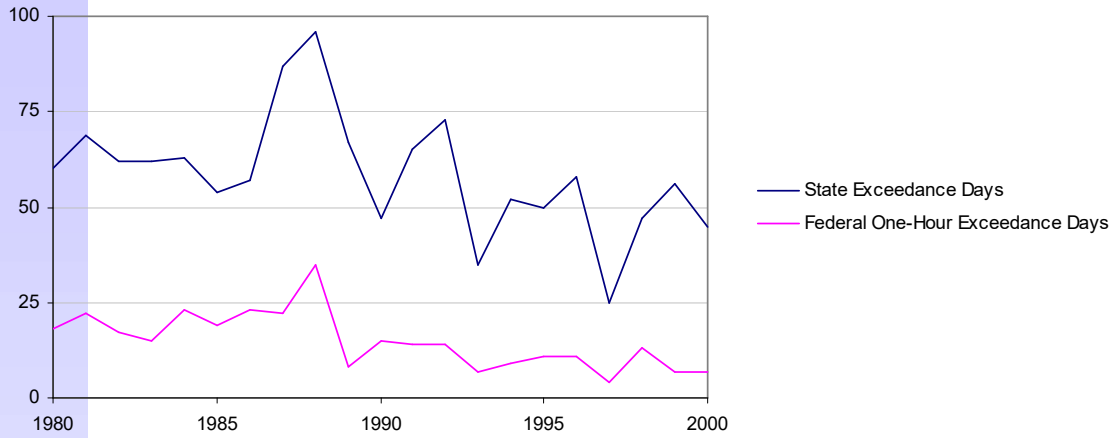
The Broader Sacramento Area's impact on other areas

Area	***Day Specific Findings***
Mountain Counties	Overwhelming
San Joaquin Valley	Significant Inconsequential
San Francisco Bay Area	Significant Inconsequential
Upper Sacramento Valley	Overwhelming Significant Inconsequential

Other areas' impact on the Broader Sacramento Area

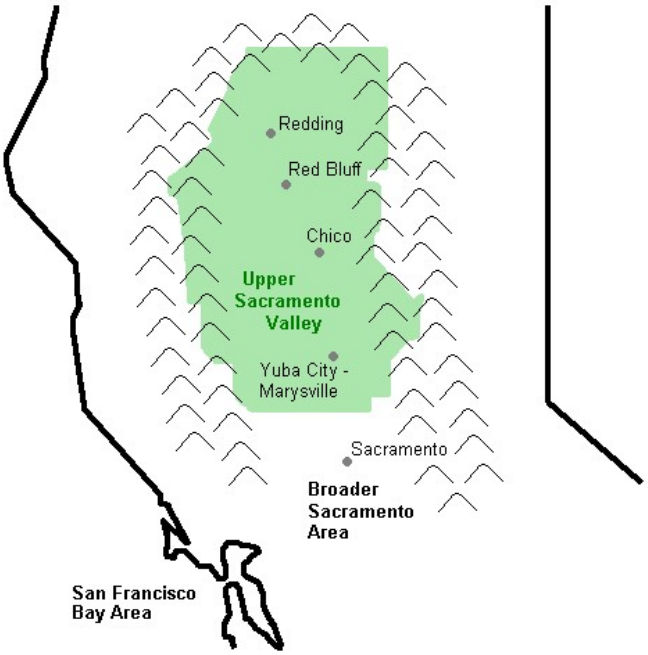
Area	***Day Specific Findings***
San Francisco Bay Area	Overwhelming Significant Inconsequential
San Joaquin Valley	Significant Inconsequential

Broader Sacramento Area
Ozone Exceedance Trends



Sacramento Valley Air Basin:

Upper Sacramento Valley



The Upper Sacramento Valley continues to violate the State ozone standard. The region attains the federal one-hour ozone standard. Most of the State ozone exceedances are caused by the transport of pollutants from the Sacramento urban area. Although the region is primarily rural, the population and vehicle miles traveled are growing, and many sources contribute emissions. The Upper Sacramento Valley counties can achieve needed reductions in pollutant levels and offset the impacts of growth by implementing all cost-effective and technologically feasible measures. For more urban or industrial areas such as Redding in Shasta County, local emission reductions are critical to attaining health-based standards.

Area Description

The Upper Sacramento Valley comprises the seven northern counties in the Sacramento Valley Air Basin, from Sutter and Colusa counties northward to Shasta County. Its largest population centers are Redding, Chico, and Yuba City-Marysville. Smaller towns are scattered throughout the region, mostly on major transportation corridors such as Interstate 5.

Redding, the seat of Shasta County, lies approximately 150 miles north of Sacramento. While Redding is influenced by transport from Sacramento, Shasta County is also a significant source of pollutant emissions in its own right. With an estimated 2000

population of roughly 176,000, Shasta County has substantial motor vehicle emissions. Shasta County also contains numerous industrial facilities, including wood and paper processing plants, cement plants, and power generating facilities. Three of the four largest stationary sources of oxides of nitrogen in the Sacramento Valley are located within Shasta County.

Transport Characterization

Topographical and meteorological conditions in Shasta County contribute to its local ozone problem. Bowl-shaped local topography tends to trap pollutants at the north end of the valley. Winds in the region sometimes blow simultaneously from opposite directions, southward from the Cascade Mountains and northward from the Broader Sacramento Area, to meet in the northern Sacramento Valley.

When this takes place, the winds usually meet south of Shasta County, meteorologically isolating Shasta County from the southern valley. When ozone violations occur under these conditions, as they did on two occasions in August 1998, they are entirely due to local emissions. In addition to contributing to high local ozone concentrations, it is possible that pollutants from the Redding area may contribute to ozone formation in neighboring counties to the south under such conditions.

Air quality in the portion of the region south of Chico is strongly influenced by transport from the Broader Sacramento Area. Much of the region is sparsely populated. When the occasional ozone violation takes place it is considered to be largely the result of transport from the Broader Sacramento Area.

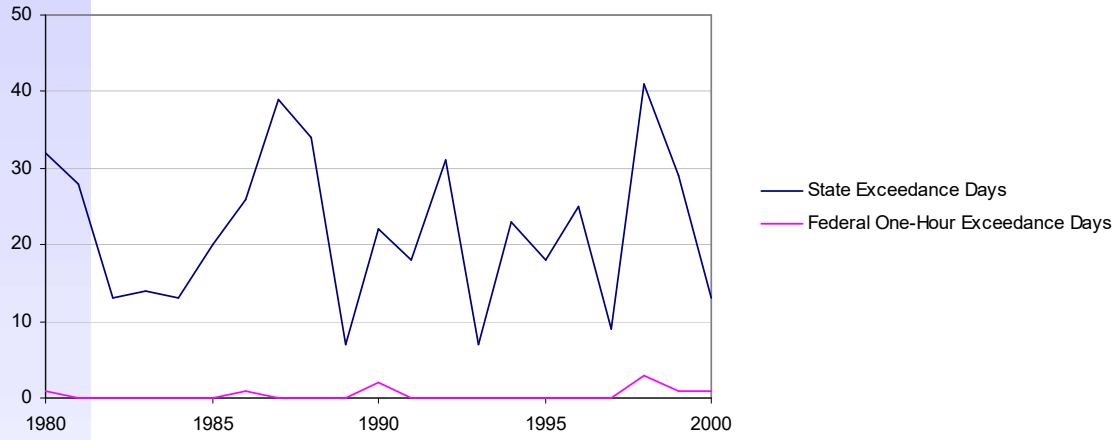
Upper Sacramento Valley Facts

		Percent of State total
Estimated 2000 Population	630,000	2%
Vehicle Miles Traveled	18.5 million miles/day	2%
Est. 2000 NOx Emissions	108 tons/day	3%
Est. 2000 ROG Emissions	116 tons/day	4%

Other areas' impact on the Upper Sacramento Valley

Area	*Day Specific Findings*
Broader Sacramento Area	Overwhelming Significant Inconsequential

Upper Sacramento Valley
Ozone Exceedance Trends



Salton Sea Air Basin

The air quality in the Salton Sea Air Basin is strongly impacted by the South Coast, and by Mexico communities to the south. The region violates the State and the federal one-hour ozone standards. All of these exceedances are partly caused by transport. However, the local population of almost one-half million people also contributes to local exceedances. Cities in the Coachella Valley are experiencing some of most rapid population growth rates in the State. As a result, local controls are important in planning for improved air quality in this region.

Area Description

The Salton Sea Air Basin occupies the southeast corner of the State, east of the South Coast and San Diego Air Basins and south of the Mojave Desert. Most of the population resides in the Coachella Valley, which runs northwest-southeast from San Gorgonio Pass to the Salton Sea, and in the Imperial Valley, south of the Salton Sea. There are no large cities in the region, but modest-sized communities are scattered through the Coachella and Imperial Valleys. These include Palm Springs, Indio, El Centro, and Calexico. Local sources of ozone precursor emissions include motor vehicles and agricultural equipment.

Transport Characterization

The mouth of the Coachella Valley, at San Gorgonio Pass, is one of the major outlets for air pollution from the South Coast. Prevailing winds blow pollutants from the South Coast into the Coachella Valley on most days in summer. Ozone violations in the Coachella Valley are predominantly due to this transport. Pollutants from the South Coast occasionally penetrate as far as the Imperial Valley to contribute to ozone violations there, but local sources of ozone precursors also contribute.

In addition, the city of Mexicali lies just across the U.S. – Mexico border from Calexico. Mexicali's population of 750,000 far outnumbers that of Calexico, and Mexicali's emissions sometimes overwhelmingly impact air quality in Calexico.

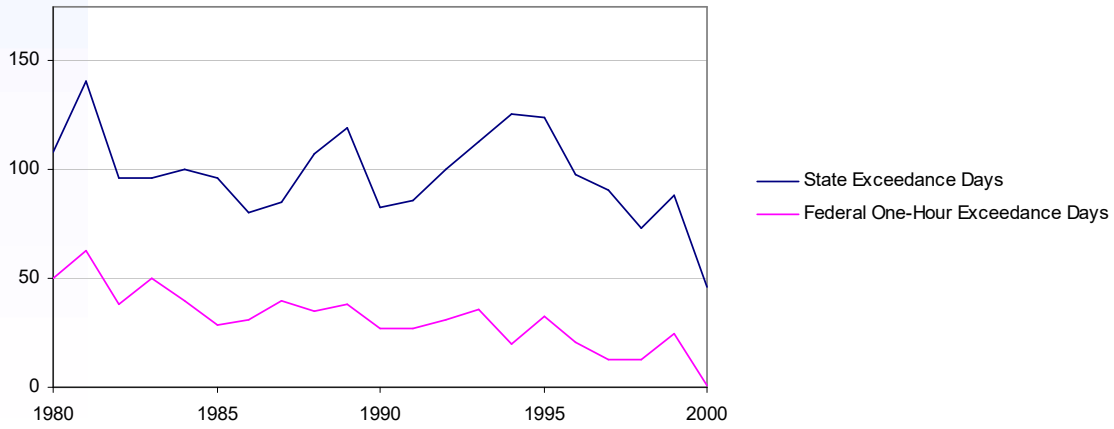
Salton Sea Air Basin Facts

		Percent of State total
Estimated 2000 Population	460,000	1%
Vehicle Miles Traveled	21.1 million miles/day	3%
Est. 2000 NOx Emissions	62 tons/day	2%
Est. 2000 ROG Emissions	52 tons/day	1%

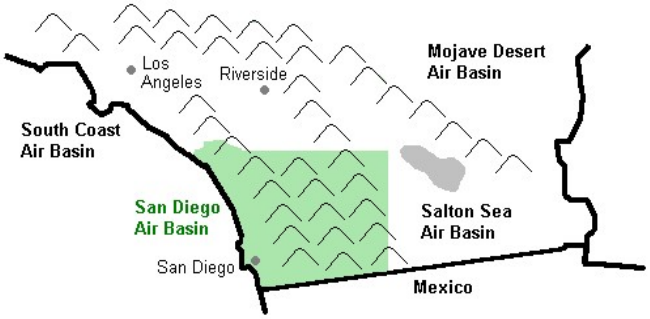
Other areas' impact on the Salton Sea Air Basin

Area	***Day Specific Findings***
Mexico	Overwhelming Significant
South Coast	Overwhelming Significant

Salton Sea Air Basin
Ozone Exceedance Trends



San Diego Air Basin



The San Diego Air Basin continues to violate the State ozone standard. The air basin is impacted by emissions from the South Coast and Mexico, but local emissions play a significant role in air quality. On some days, local emissions are solely responsible for violations of the State ozone standard. Although the San Diego Air Basin has not exceeded the federal one-hour ozone standard since 1998, emissions within San Diego County must be reduced in order to maintain the federal one-hour standard and to attain the State Standard.

Area Description

San Diego and its environs constitute the third largest urbanized area in the State after the South Coast and the San Francisco Bay Area. The county of San Diego has roughly 2.9 million inhabitants. Located on the coast 100 miles south of Los Angeles, San Diego is home to numerous industrial and transportation facilities, military installations, an international airport, and a shipping port.

The city of San Diego is situated on a hilly coastal plain roughly 15 miles wide, bounded on the east by the peninsular ranges. The southern part of the urban area borders Mexico.

Transport Characterization

San Diego has also been shown to be impacted by transport from the South Coast. However, given its large population, numerous stationary sources, its climate, and its topography, San Diego County emissions can also result in local ozone violations. Prevailing daytime winds tend to carry pollutants from San Diego and El Cajon toward the east. Thus, some of the violations at Alpine, in the mountains east of San Diego, can be caused by emissions from within San Diego County.

Tijuana, a city of 1.2 million people, lies immediately across the border, forming essentially one continuous urban area with San Diego. The air above the two cities is

one single mass; emissions from Tijuana have been demonstrated to impact air quality in San Diego, and San Diego's emissions can have an impact upon Tijuana's air quality.

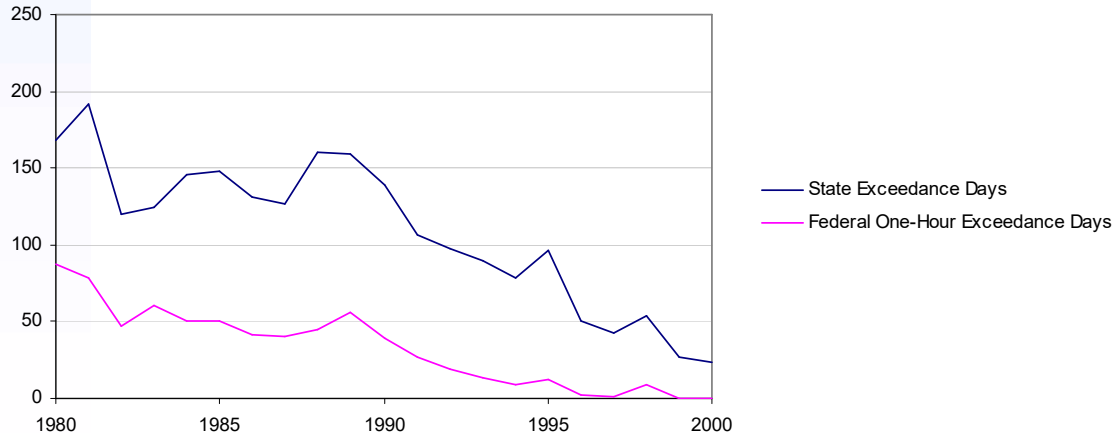
San Diego Air Basin Facts

		Percent of State total
Estimated 2000 Population	2.9 million	8%
Vehicle Miles Traveled	71.5 million miles/day	9%
Est. 2000 NOx Emissions	234 tons/day	7%
Est. 2000 ROG Emissions	239 tons/day	7%

Other areas' impact on the San Diego Air Basin

Area	***Day Specific Findings***
Mexico	Overwhelming Significant Inconsequential
South Coast	Overwhelming Significant Inconsequential

San Diego Air Basin
Ozone Exceedance Trends



San Francisco Bay Area Air Basin

Emissions from the San Francisco Bay Area contribute to poor air quality throughout Northern California, including the San Joaquin Valley, Broader Sacramento Area, Mountain Counties, and the coastal areas from Sonoma County to San Luis Obispo County. The Bay Area has violated the State and federal health-based standards many times over the last several years, and has contributed to air pollution problems in all of the surrounding air basins. The Bay Area must continue to reduce local emissions to achieve healthful air locally and downwind.

Area Description

The San Francisco Bay Area occupies a central location on California's coast. Home to nearly seven million people, the Bay Area is the second largest urban area in the State after the South Coast. It has a heavy concentration of industrial facilities, several airports, a major international port, and a dense freeway and surface street network. These air pollution sources result in high concentrations of ozone and ozone precursors. Pollutants carried by the wind from the Bay Area to surrounding areas have a major impact on air quality in those areas.

During the summer, winds usually blow from west to east, off the Pacific Ocean. Swept by sea breezes, much of the Bay Area enjoys relatively good air quality. However, interior valleys such as Livermore Valley and Santa Clara Valley experience ozone violations in summer. Since the Bay Area is upwind of much of central California, pollutants transported from the Bay Area affect a large part of central California.

Transport Characterization

Mountains surround the Bay Area to the north, east and south. Air pollution escaping the area flows mainly through a small number of gaps in these mountains. Toward the east, air flows predominantly through two natural passageways: the mouth of the Sacramento River at the Carquinez Strait, and Altamont Pass, east of Livermore. Through the Carquinez Strait the so-called "delta breeze" blows steadily into the Central Valley in the summer, carrying ozone and precursors far into the Sacramento and San Joaquin Valleys.

At the Altamont Pass, electricity-generating windmills lining the hill crests attest to the strong, steady winds blowing eastward into the San Joaquin Valley. Areas in the path of these natural inland air currents, such as Vacaville in the Sacramento Valley, and Tracy in the San Joaquin Valley, are strongly influenced by pollutants transported from the Bay Area. Areas farther downwind, such as the cities of Sacramento and Stockton, are also impacted by transport from the Bay Area, but to a lesser degree.

On some days when the State standard is violated in the Sacramento area, pollutants from the Bay Area are carried in by the delta breeze. However, on hot summer days when the temperature in Sacramento climbs into the high 90's and above, stagnant wind conditions allow a buildup of local emissions, and the ozone concentration can violate the State or federal standards. Only when a strong evening delta breeze disperses these accumulated pollutants do the ozone concentrations decrease.

On some days, pollutants transported from the Bay Area also impact the northern San Joaquin Valley, mixing with local emissions to contribute to State and federal violations at Stockton and Modesto. On other days, violations of the State standard are due entirely to local emissions. The impact of Bay Area transport diminishes with distance, so metropolitan areas such as Fresno and Bakersfield to the south are less affected. In those areas, ozone concentrations are dominated by local emissions.

Even as far east as the Sierra Nevada foothills, air quality in communities such as Jackson, San Andreas and Angels Camp in Amador and Calaveras Counties is sometimes affected by pollution originating in the Bay Area. Because winds blowing from the Bay Area to the Sierra Nevada pass over the northern San Joaquin Valley, emissions from the San Joaquin Valley also contribute to violations in the foothills.

To the south, winds funnel pollutants into the Santa Clara Valley. Surface winds can carry these pollutants southeast to Hollister in the North Central Coast Air Basin. Most ozone violations in Hollister are largely caused by this transport, with transport aloft from the northern San Joaquin Valley occasionally making a shared contribution. Winds aloft can also carry pollutants over the hills south of Hollister, as far as northern San Luis Obispo County.

Southward transport from the Bay Area offers a striking example of the three-dimensional nature of pollutant transport. On days when ozone levels stay well below the standard in Hollister, the southward-blowing wind several hundred feet overhead may be heavily laden with pollutants from the Bay Area. This can cause violations at Pinnacles National Monument at an elevation of 1,100 feet.

The pollutants can continue south, occasionally combining with pollutants transported from the San Joaquin Valley, to cause violations in the Paso Robles area of San Luis Obispo County. Gathering local emissions from Paso Robles, the polluted air mass may then be blown farther south to cause violations in Atascadero. Thus, violations at Paso Robles can be caused by transported pollutants, while violations on the same day at Atascadero are caused by a mixture of local and transported emissions.

The northern portion of Sonoma County has only recently experienced violations of the State ozone standard. Summer prevailing winds blow across the Sonoma Plain from the southern portion of Sonoma County, which lies within the Bay Area, to the northern part, which lies within the North Coast Air Basin. The Bay Area portion of Sonoma County, comprising the urban areas of Santa Rosa and Petaluma, is a substantial source of ozone precursor emissions. High ozone concentrations at Healdsburg, in the North Coast, are entirely due to emissions transported from the Bay Area.

San Francisco Bay Area Air Basin Facts

		Percent of State total
Estimated 2000 Population	6.8 million	20%
Vehicle Miles Traveled	130 million miles/day	16%
Est. 2000 NOx Emissions	558 tons/day	16%
Est. 2000 ROG Emissions	535 tons/day	16%

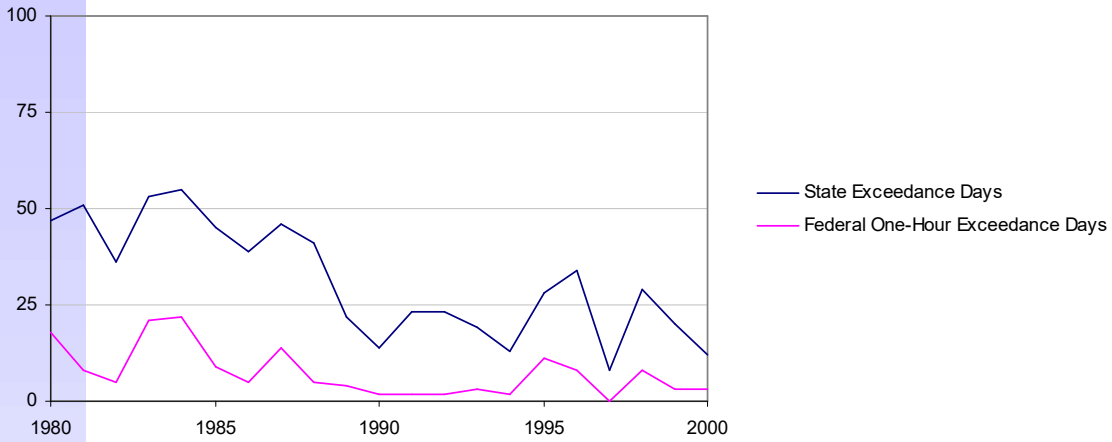
The San Francisco Bay Area Air Basin's impact on other areas

Area	***Day Specific Findings***
Broader Sacramento Area	Overwhelming Significant Inconsequential
Mountain Counties	Significant
North Central Coast	Overwhelming Significant
North Coast	Overwhelming
San Joaquin Valley	Overwhelming Significant Inconsequential
South Central Coast	Significant

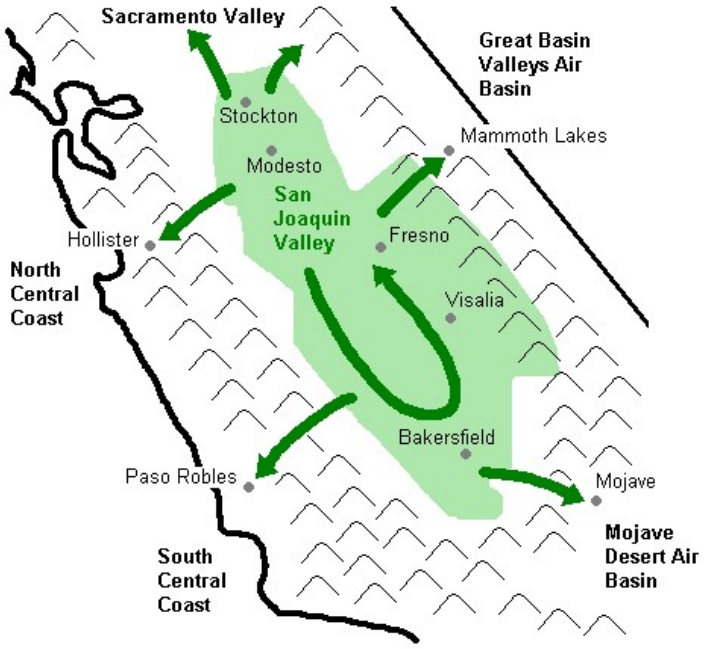
Other areas' impact on the San Francisco Bay Area Air Basin

Area	***Day Specific Findings***
Broader Sacramento Area	Significant Inconsequential

San Francisco Bay Area Air Basin
Ozone Exceedance Trends



San Joaquin Valley Air Basin



The San Joaquin Valley Air Basin continues to violate the State and federal ozone standards. Because the area failed to meet the Clean Air Act 1999 attainment deadline for the federal standard, the Valley is expected to be reclassified as severe nonattainment. Although the Valley is impacted by pollutants transported from other air basins, the impact declines from north to south. The Valley's worst air quality is primarily a result of local emissions. In addition, the Valley transports pollutants to most of the surrounding air basins. To meet the federal ozone standard by the 2005 deadline, the Valley will need to substantially reduce emissions, an effort that will also aid progress towards attaining the State standard.

Area Description

The San Joaquin Valley, with a population of 3.3 million, is one of the fastest growing regions of California. The Valley stretches 300 miles, about one-third the length of the State. Its major population clusters, Stockton-Modesto, Fresno-Visalia and Bakersfield, are widely separated, linked together by State Route 99. While they share similar topographical settings and climate, each has its own distinct impact on surrounding areas.

Most of the Valley's industry is related to agriculture. Nevertheless, forest products and oil production and refining form a significant portion of the industrial base and emission inventory. Emissions from agricultural operations are generated throughout

the Valley. Motor vehicle emissions are concentrated along the Highway 99 and Interstate 5 corridors, while larger industrial sources and their impact are clustered mainly in the southern region.

The San Joaquin Valley is bounded on the west by the Coast Ranges, on the east by the Sierra Nevada, and on the south by the Tehachapi Mountains. While these mountain ranges are substantial barriers to airflow, river canyons and passes provide channels through which pollutants can flow into other areas of the State. Since the Valley is broad and flat with no significant hills or geographical features, air flows unobstructed throughout the Valley. The Valley's sunny climate and growing population lead to high ozone concentrations.

Transport Characterization

Peak summer ozone concentrations throughout the Valley have remained fairly constant for the last decade. Although the number of days violating the State ozone standard has decreased slightly, northern, central and southern regions all continue to violate the State ozone standard during much of the summer. While the northern part of the Valley is impacted by transport from neighboring air basins to some degree, the further south one goes the smaller the impact of transport. Throughout the Basin local emissions have a dominant influence on ozone concentrations.

Transport of pollutants within the San Joaquin Valley plays a significant role in ozone violations. Prevailing winds blow from the northern part of the Valley to the south, and can carry pollutants from San Joaquin and Stanislaus Counties to the Fresno area. Pollutants transported from the San Francisco Bay Area south to Fresno must pass through the northern Valley, so transport from the San Francisco Bay Area to Fresno is combined with a northern Valley contribution. Further south, eddy currents can carry pollutants along the east side of the Valley from Tulare County and northern Kern County to the Fresno Area.

The northern part of the Valley, comprising the urban areas of Stockton, Modesto and Turlock, is due east of San Francisco Bay Area. It has a combined population of roughly 1.2 million. On summer days, the delta breeze blows through the Carquinez Strait, eastward into the Central Valley. As it blows east, the delta breeze fans out to the north and south. In the vicinity of Stockton, the prevailing wind direction on most summer mornings is toward the south.

On some days, pollutants transported from the Bay Area impact the northern San Joaquin Valley, mixing with local emissions to contribute to State and federal violations at Stockton and Modesto. On other days, violations of the State standard are due entirely to local emissions. The impact of Bay Area transport diminishes with distance, so metropolitan areas such as Fresno and Bakersfield to the south are less affected.

Under certain conditions, winds blowing from the south and southwest can carry pollutants from the northern Valley towards Sacramento. Although there is a potential for transport impacts, transport from the northern Valley to the southern part of Sacramento occurs infrequently.

The delta breeze typically carries polluted air from the Valley into the Sierra Nevada foothills to the southeast, causing ozone violations in the foothill areas such as Sonora, in Tuolumne County, and in Yosemite National Park. In the foothills further to the north, pollutants from the Valley combine with pollutants transported from the San Francisco Bay Area and Broader Sacramento Area to cause ozone violations in Amador and Calaveras Counties. Since the foothill communities are small and do not generate significant local emissions, these violations are considered to be entirely the result of transport.

Occasionally, winds aloft carry pollutants from the northern Valley westward to the Hollister area, in the North Central Coast Air Basin. There, they mix down to the ground and combine with local emissions and pollutants transported from the San Francisco Bay Area to cause ozone violations. The San Francisco Bay Area is believed to contribute the largest share of pollutants.

The central portion of the Valley includes the cities of Fresno and Visalia. With a rapidly growing population currently estimated at roughly 1.4 million, the central Valley has a broad impact on air quality in surrounding areas. For the last several years the Fresno area has experienced the highest ozone concentrations in the Valley, consistently violating the State ozone standard. These violations are predominantly caused by local emissions.

Transport from the central portion of the Valley is responsible for ozone violations in Mammoth Lakes, on the eastern slope of the Sierra Nevada. From the Valley, winds carry pollution eastward up the canyons of the western Sierra Nevada during the day, as far as the crest of the Sierra. From there, pollutants flow east to the Mammoth Lakes area via gaps in the crest. Typically, the violations in Mammoth Lakes occur late at night or in the early morning; a pattern always associated with transported emissions.

Winds also carry pollutants from the Valley to the west. Under rare weather conditions, these pollutants can combine with local emissions and ozone transported south from the San Francisco Bay Area to cause ozone violations in northern San Luis Obispo County. The communities of Paso Robles and Atascadero are separated from the San Joaquin Valley by the Cholame Hills and the Temblor Range, which run northwest-southeast almost in a straight line.

Infrequently, as ozone from the Valley rises, it is carried west over the intervening mountains by the wind, and arrives at Paso Robles by midday. There, it mixes down to the ground and combines with ozone flowing southward from the San Francisco Bay Area to cause violations at ground level. This polluted air mass can then gather local emissions and flow south to Atascadero. Thus, violations at Paso Robles can be caused

by transported pollutants, while violations on the same day at Atascadero are caused by a mixture of local emissions and transport.

The southern part of the Valley consists of Kings County and the western half of Kern County. It includes Bakersfield and surrounding communities. The population of the southern Valley is roughly 700,000. In addition to motor vehicle emissions, oil production and refining contribute to ozone precursor emissions from this area. Violations in Kern County are almost entirely due to local emissions.

In the summer, persistent winds blow from the San Joaquin Valley southeastward through the Tehachapi Pass into the Mojave Desert. Ozone violations in eastern Kern County, immediately downwind of the pass, have been shown to be caused by this transport. The emissions from eastern Kern County are too small to constitute a significant source of local emissions. Further downwind at Lancaster, in the Mojave Desert portion of Los Angeles County, violations have been caused by transport from the southern Valley. However, air quality in the Lancaster area is dominated by transport from the South Coast, and local emissions also make a substantial contribution.

San Joaquin Valley Air Basin Facts

		Percent of State total
Estimated 2000 Population	3.3 million	10%
Vehicle Miles Traveled	94.2 million miles/day	12%
Est. 2000 NOx Emissions	596 tons/day	17%
Est. 2000 ROG Emissions	513 tons/day	15%

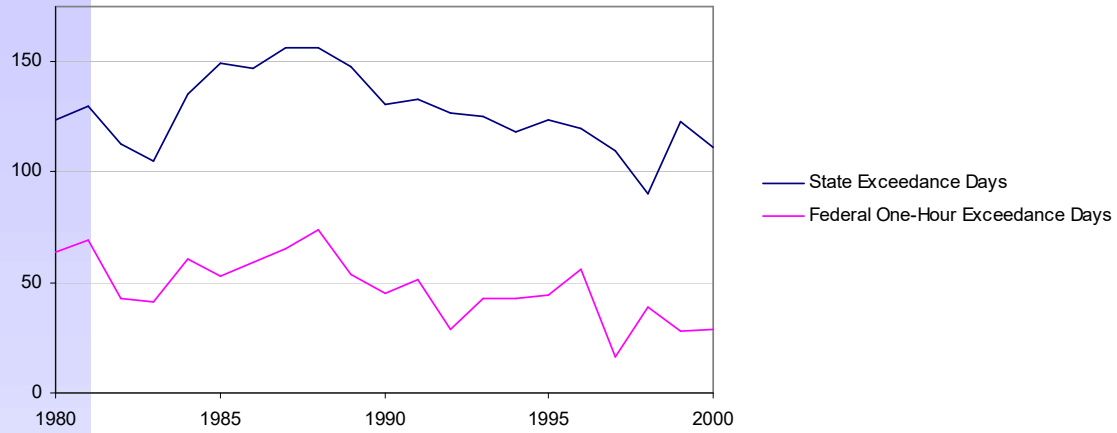
The San Joaquin Valley Air Basin's impact on other areas

Area	***Day Specific Findings***
Broader Sacramento Area	Significant Inconsequential
Great Basin Valleys	Overwhelming
Mountain Counties	Overwhelming
Mojave Desert	Overwhelming
North Central Coast	Significant
South Central Coast	Significant Inconsequential

Other areas' impact on the San Joaquin Valley Air Basin

Area	***Day Specific Findings***
Broader Sacramento Area	Significant Inconsequential
San Francisco Bay Area	Overwhelming Significant Inconsequential

San Joaquin Valley Air Basin
Ozone Exceedance Trends



South Central Coast Air Basin

All three counties in the South Central Coast Air Basin continue to violate the State ozone standard. The number of violations decreases as one moves north from the Ventura – Los Angeles county border. Air quality in Ventura County is considered severe with respect to the federal one-hour ozone standard, but Santa Barbara County no longer violates the federal standard (the district is in the process of requesting re-designation to attainment) and San Luis Obispo County attains the federal standard. Although the air basin is impacted by transport from three air basins and oil operations in the coastal waters offshore, local emission controls are needed throughout the South Central Coast to attain all ozone standards.

Area Description

The South Central Coast includes San Luis Obispo, Santa Barbara and Ventura Counties. Topography and wind patterns link Santa Barbara and Ventura Counties with the South Coast Air Basin. San Luis Obispo County is separated from the other two counties by mountains, and its air quality is more closely linked with that of the San Francisco Bay Area and San Joaquin Valley. Because of the differences in topography and air quality, the three counties are treated as separate planning areas.

Santa Barbara and Ventura Counties lie immediately to the northwest of the South Coast, and are both sources and recipients of transported pollutants. While the population and total emissions of pollutants in Santa Barbara and Ventura Counties are dwarfed by those of the South Coast, the two counties constitute a significant source of pollutants. The two counties have a combined population of roughly 1.2 million. Power plants, oil extraction and oil refining emit substantial amounts of ozone precursors. Transportation and agricultural activities also contribute emissions.

San Luis Obispo County supports a population of roughly 255,000 people. Much of the population lives in the city of San Luis Obispo and nearby coastal communities. To the north, separated from the coast by mountains, lie the towns of Paso Robles and Atascadero, each numbering roughly 25,000 inhabitants.

Transport Characterization

Ozone violations in Santa Barbara and Ventura Counties are sometimes caused by local emissions, and sometimes caused by a mixture of transported and local emissions. Pollutants from the South Coast Air basin can be blown offshore and carried to the coastal cities of both counties. Pollutants can also impact Ventura County by way of an inland route from the San Fernando Valley in Los Angeles County.

The San Fernando Valley extends almost up to the eastern boundary of Ventura County, separated only by moderately high hills. Modeling studies have shown that when winds blow from the coast, eastward through the Simi Valley, pollutants from Santa Barbara and Ventura County can be carried into the San Fernando Valley and contribute to violations there.

Ozone violations in San Luis Obispo County occur in the northern portion of the county, measured at monitors in the cities of Paso Robles and Atascadero. Air quality in Paso Robles is impacted by pollutants transported aloft from the San Francisco Bay Area and San Joaquin Valley. Transported pollutants can then mix with local emissions from Paso Robles and be blown south to cause violations at Atascadero.

While Santa Barbara and Ventura Counties are impacted by transport from the South Coast, local emissions have a significant impact on local air quality. San Luis Obispo County receives transported pollutants from the San Francisco Bay Area and San Joaquin Valley, but local emissions also contribute to or can solely cause ozone violations in Atascadero. Under some conditions Santa Barbara and Ventura Counties can contribute to ozone violations in the South Coast.

South Central Coast Air Basin Facts

		Percent of State total
Estimated 2000 Population	1.4 million	4%
Vehicle Miles Traveled	34.9 million miles/day	4%
Est. 2000 NOx Emissions	136 tons/day	4%
Est. 2000 ROG Emissions	141 tons/day	4%

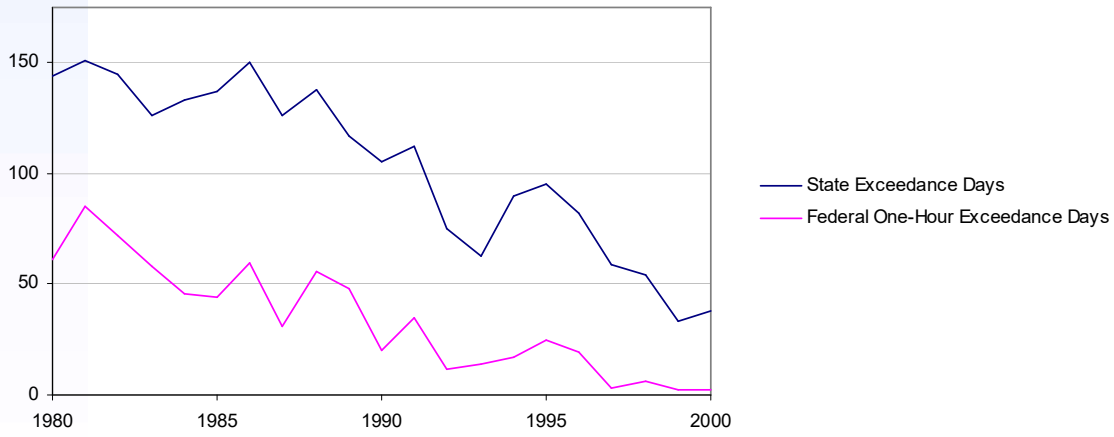
The South Central Coast Air Basin's impact on other areas

Area	*Day Specific Findings*
South Coast	Significant Inconsequential

Other areas' impact on the South Central Coast Air Basin

Area	*Day Specific Findings*
San Francisco Bay Area	Significant
San Joaquin Valley	Significant
South Coast	Significant Inconsequential

South Central Coast Air Basin
Ozone Exceedance Trends



South Coast Air Basin

With roughly 40 percent of the State's population, emissions from the South Coast Air Basin cause or contribute to violations of the State ozone standard in almost all adjacent air basins. While air quality in the South Coast has improved markedly over the last decade, significant additional reductions will be needed beyond 2010 to achieve the State ozone standard in the South Coast and neighboring areas.

Area Description

The South Coast, with an estimated 2000 population of nearly 15 million, is the largest urban area in the western United States. Virtually all of the coastal portion of the South Coast, an area of over 1,000 square miles, is urbanized. The area is served by an enormous transportation network of freeways, surface streets, airports, seaports, and railroads, all of which contribute ozone precursor emissions. The area's large and diverse industrial and commercial sectors, as well as construction activities, fuel refining and distribution, and consumer product usage also contribute to the region's emissions.

The South Coast is bounded on the west by the Pacific Ocean, and surrounded on the other sides by mountains which tend to channel and confine airflow. To the north lie the San Gabriel Mountains, to the north and east the San Bernardino Mountains, to the southeast the San Jacinto Mountains, and to the south the Santa Ana Mountains. Winds aloft can carry pollutants over the surrounding mountains and play an important role.

Transport Characterization

While the South Coast has historically suffered the highest ozone concentrations in the United States, the region has seen dramatic improvements in air quality in the last two decades. Since the South Coast dwarfs its neighboring areas, air quality throughout most of the basin is dominated by emissions from within the South Coast.

The urbanized area of the South Coast extends within 20 miles of the boundary of San Diego County, its neighbor to the south. Transport from the South Coast can cause violations at coastal sites in San Diego County such as Oceanside and Del Mar. This typically occurs when offshore winds sweep polluted air from the South Coast over the ocean. Coastal winds carry the polluted air south, and the usual onshore breeze then carries the polluted air over coastal areas of San Diego County.

Transport may also take place via one or more inland routes. The South Coast can be the source of high ozone levels in Escondido, and a contributor to violations in the foothills east of San Diego. However, the South Coast's contribution to ozone violations in San Diego County varies from one day to another. The San Diego urban area is a significant source of ozone precursor emissions and can be the sole cause of violations in the eastern part of the county on some days.

The Salton Sea Air Basin comprises the desert area to the southeast of the South Coast. It includes the Coachella Valley, with its communities of Indio and Palm Springs, and the Imperial Valley to the south. In the summer, prevailing winds push polluted air eastward from the South Coast, through the San Gorgonio Pass, then southeast through the Coachella Valley. Air quality at Palm Springs and Indio is dominated by pollutants transported from the South Coast.

From the Coachella Valley, winds can carry these pollutants further southeastward into the Imperial Valley. However, ozone from the South Coast must travel over 100 miles to reach the Imperial Valley. By the time it arrives, the ozone is diluted. Ozone violations in the Imperial Valley are considered to be caused by a mixture of South Coast transport, local emissions, and transport from Mexicali, across the border in Mexico.

Ozone transported from the South Coast is primarily responsible for violations in the populated areas of the Mojave Desert Air Basin immediately to its north. The Mojave Desert Air Basin is separated from the South Coast by the San Gabriel and San Bernardino Mountains. When the inversion layer is sufficiently high, winds carry ozone through passes and over the mountains into the Mojave Desert where pollutants mix down to the ground and impact air quality.

Transport can also take place along the surface through Cajon Pass and Soledad Pass. The roughly 400,000 people living in the strip of the Mojave Desert immediately adjacent to the South Coast are the most affected. Violations at Lancaster, Hesperia, Victorville and Phelan are usually dominated by transport from the South Coast. However, meteorological analyses have demonstrated that ozone violations in this area can be caused by a mixture of local emissions as well as transport from the South Coast. As far east as Barstow, pollutants transported from the South Coast can cause or contribute to ozone violations.

The coastal counties of Ventura and Santa Barbara County lie immediately to the northwest of the South Coast, and their air quality is heavily influenced by transport

from the South Coast. In 1996, transport from the South Coast was shown to have contributed to all violations of the federal ozone standard in Santa Barbara County.

Transport from the South Coast to the South Central Coast can take place at the surface or aloft. At the surface, winds blowing northwestward from the South Coast carry ozone over the ocean to Ventura and Santa Barbara Counties. Ozone trapped aloft above the South Coast can accumulate in high concentrations, be blown northwest, mix down to the surface and combine with local emissions to cause violations.

Air quality in the South Coast Air Basin is driven almost entirely by emissions generated within the basin. The exception is the San Fernando Valley in west-central Los Angeles County, which is occasionally impacted by emissions from Ventura and Santa Barbara Counties.

South Coast Air Basin Facts

		Percent of State total
Estimated 2000 Population	14.9 million	43%
Vehicle Miles Traveled	320 million miles/day	40%
Est. 2000 NOx Emissions	1,207 tons/day	34%
Est. 2000 ROG Emissions	1,092 tons/day	33%

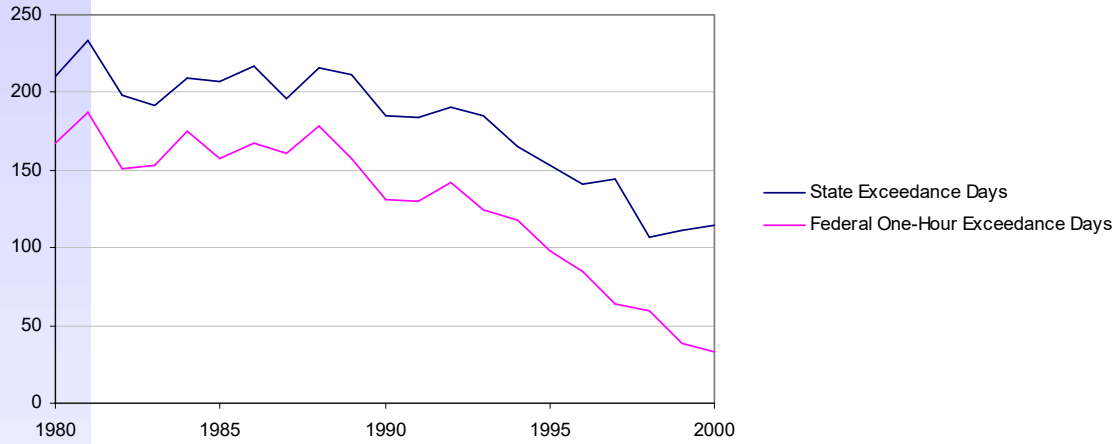
The South Coast Air Basin's impact on other areas

Area	***Day Specific Findings***
Mojave Desert	Overwhelming Significant
Salton Sea	Overwhelming Significant
San Diego	Overwhelming Significant Inconsequential
South Central Coast	Significant Inconsequential

Other areas' impact on the South Coast Air Basin

Area	*Day Specific Findings*
South Central Coast	Significant Inconsequential

South Coast Air Basin
Ozone Exceedance Trends



References

(1) The 2001 California Almanac of Emissions and Air Quality. California Air Resources Board, Technical Support Division.

(2) Assessment of the Impacts of Transported Pollutants on Ozone Concentrations in California, 1990. California Air Resources Board, Technical Support Division.

(3) Triennial review of the Assessment of the Impacts of Transported Pollutants on Ozone Concentrations in California, 1993. California Air Resources Board, Technical Support Division.

(4) Second Triennial review of the Assessment of the Impacts of Transported Pollutants on Ozone Concentrations in California, 1996. California Air Resources Board, Technical Support Division.

(5) Assessment of the Impacts of Transported Pollutants on Ozone Concentrations in California, 2001. California Air Resources Board, Planning and Technical Support Division.

All of the publications listed above are available from the California Air Resources Board by calling the Public Information Office at (916) 322-2990. The 2001 California Almanac of Emissions and Air Quality can also be downloaded from the ARB web site at

http://www.arb.ca.gov/aqd/almanac01/almanac01.htm

Additionally, air quality data from 1980 forward are available on a CD-ROM which can be obtained from the Public Information office or by ordering from the ARB web site at

http://www.arb.ca.gov/aqd/aqdcd/aqdcd.htm